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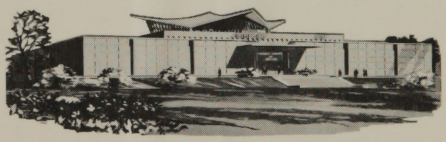

U. S. Department of Health, Education, and Welfare

PUBLIC HEALTH SERVICE

THE DISPOSAL OF THE DEAD;

A PLEA FOR CREMATION.

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THE

DISPOSAL OF THE DEAD,

A PLEA FOR CREMATION.

BY

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PREFACE.

The subject of cremation has, of late years, awakened much interest in the minds of those studying the wise provisions of sanitary laws, and has been discussed before medical societies, and indeed even in the semi-medical, semi-popular literature of the day.

The present volume is given to the public as an exposition of the present state of the subject. Its mission is to point out the evils of inhumation, to assist in removing the prejudice against cremation, and to secure new advocates for this system of disposal of the dead.

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In beginning the consideration of the question of the disposal of the dead it may not be uninteresting to briefly record some of the various methods resorted to by savage, as well as by civilized nations, for the disposal of human remains.

Some of the plans adopted seem to have had for their object simply the honoring of the dead, without regard to the effects on the living of the disposition of bodies undergoing more or less speedy decomposition. Such were those con-

ceived and in general use among barbarous tribes—as, for example, the Assingi and Ashira tribes of Africa, who allow the body to remain in the house until it becomes putrid; then the nearest relative carries it outside the village and places it *on* the ground. Other tribes place their dead in trees, either in the forks formed by the branching limbs or bound securely to the limbs. Variations of these two methods will embrace two of the principle modes of savage burial—namely, *on the surface of the earth*, and *in the air*. A form of burial more nearly allied to that most prevalent at the present time is that in which the bodies were placed *in natural caves in the rocks*, and *in artificial earth caves*: This was, in embryo, the same idea developed by civilized nations into cemeteries.

A modification of cave burial—or, perhaps, more properly of tree burial—is that in vogue among the natives of some parts of Australia, who place the body in a canoe coffin covered over with leaves and grasses, and either lift it into the fork of a tree and lash it to the boughs, or elevate it on poles.

A mode of disposing of the dead, prevalent among island savages, and one which is not without its advocates at the present day, as being the best solution of this problem, is that of *burial in the sea*. If we candidly admit, that, sentiment aside, the object of burial is the speedy resolution of the body into its elements without harm to the living, this method of burial, from a sanitary point of view, must claim the consideration of agitators of this subject.

As we leave the simple forms of burial practiced by savage tribes and glance at the more elaborate methods of tribes and nations in a higher state of development, we cannot fail to remark the very slight differences that distinguish them. Thus, *burying directly in the earth*, one of the simplest forms of burial, in a slightly modified though essentially the same form (the encasement of dead bodies in wicker baskets), has been, within the past few years, advocated by those conscious of the evils attendant on a process of slow decomposition, but to whom cremation is abhorent. Conspicuous among these is Francis Seymour Haden, F.R.C.S.,

who published, in 1875, a series of letters setting forth the advantages of burial in wicker baskets, through the interstices of which the process of transmutation of the dead body into innoccuous soil might speedily be accomplished.

Again, cremation—which many consider the outcome of the theories of scientists, devoid of sentiment and proper reverence for the dead—was not only practiced by the most enlightened ancient nations, but is in vogue as well at the present day (not considering European nations) among the Japanese, Siamese, Hindoos, etc. In Australia, also, the natives around Portland Bay let the dead body down into a hollow tree, heap upon it a quantity of dry leaves and grasses, and consume the whole by fire. In other tribes of Australia, when a young warrior dies, a moderately high platform is erected, upon which the body is seated; the fat is then removed, and after being mixed with red ochre, is rubbed over the body, which has previously been carefully denuded of hair. Fires are now lighted under the platform and kept up for ten days or more, after which the body is allowed

to remain in the same position for two or three months. After the prolonged smoking and exposure it becomes hard and mummy-like, and is then buried.

In New South Wales a pile of dry leaves, wood, etc., is built about three feet in height and six or seven in length. The body is then laid on its back on this pile and covered with large logs of wood. The pile is fired by the nearest relative, and on the following day, when the place is cool, the ashes of the dead are collected and carefully buried.

A very singular method of treating dead bodies is that in vogue among some Australian tribes, who, after decomposition has progressed to such an extent that the flesh can be separated from the bones, collect the bones, cleanse and paint them, wrap them in bark, and carry them about for a while. Subsequently they are either placed in cavities in the rocks, in hollow trees, or in pits dug in the ground.

The Abyssinians wrap the body in a cloth made of palm leaves and bury it on the day of

death, which custom would certainly be an improvement on our present system of delaying burial until the body has become offensive.

The Alfoers (of New Guinea), after keeping the body for several days, expose it in the woods, on a platform erected for the purpose.

Among the more commemorative modes of burial which have been held in high esteem by nations in an advanced state of culture, none has—perhaps on account of its extent, elaborate ceremonies, and mystical rites—more attracted the study of the curious investigator than *mummification.* A method followed for so long a time, and by such a large and intelligent nation, must have many points to commend it to the consideration of those who, by an impartial review of all modes of disposing of the dead, desire to select that one most approved by the dictates of common sense, and conforming most nearly to the educated conception of expediency.

Encasement in solids, which is practically burial in stone coffins, has been recently advocated in Germany. We quote an account of this form of

burial, with the author's comments, from a recent English work, by William Eassie, C. E., (*Cremation of the Dead*, p. 28).

"The method consists of encrusting the subject over with a cement, and, after placing it in a sarcophagus of similar artificial material, to pour more of the same matter in a fluid state around it, so that the dead would be entombed in a solid matrix of long-enduring material. But those who are practically acquainted with the nature of cements, or rather with the impossibility of resting assured that proper cements would always be used, will know that it is more than likely that, out of the 32,000 who are said to die annually per million, one-half of the bodies would be enveloped in an impoverished material which would speedily fall to pieces, with disastrous results. Dr. Sedgwick has expressed himself as certain that even plaster-of-Paris would prove ineffective in preventing the exhalations from dead bodies.

"Supposing, too, that each of the defunct required a space of one cubic yard only; where could cemeteries be obtained which could afford permanently to alienate 32,000 cubic yards of space per million annually? The scheme carries wildness on its very face."

It remains for us to mention the forms of burial now most generally adopted by all nations—namely, burying in the earth *indirectly*,

the body being encased in a receptacle prepared for it, of varying degrees of solidity, and power of resistance to the resolvent properties of the soil; and lastly, cremation, whose disciples are daily gaining new converts, and which is in active operation in so many countries.

Chapter II.

THE EVILS OF BURIAL.

The Necessity of Immediate Action — Contamination of Earth, Air and Water in and near Grave-yards — Analysis of Air and Water in and near Grave-yards — Effects of Poisoned Air upon the Organism — Instances of Contamination of Air by Proximity to Grave-yards — Soil of Grave-yards Saturated with Products of Decomposition — Effect on Grave Diggers — Parliamentary and Health Commissioners' Reports on Intra-Mural Sepulchre — Contamination of Wells and Water Courses — Diseases prevalent in and near Grave-yards, (Diarrhœa, Dysentery, Diseases of the Throat and Lungs, Malignant Fevers, Asphyxia, Suffocating Catarrhs, &c.) — Darwin's and Pasteur's Experiments — Recorded Instances of Diseases and Epidemics produced by Proximity to Grave-yards, and by opening graves.

The most enthusiastic opponents of cremation, the strongest adherents to the form of burial in general use, the most stolid conservative, and the most sentimental of sentimentalists will admit that there are valid objections against

inhumation or burial, as now practiced—objections which are so prolific of danger to the living, such fertile sources of death, that they cannot fail to obtrude themselves on the minds of the most unreflective. It is our purpose to examine these by the light of undisputed recorded facts and the knowledge born of past experience, that we may discover, at least approximately, the harm that has already been done and is now resulting from the constant operation of these objectionable causes. We hope by this simple recital of facts to awaken a spirit of inquiry, which is all that is required to convince the skeptical of the actual danger of burial to health and life, and the necessity for a substitute.

Though it may be urged that the facts do not apply to a new country like our own, where the vast amount of unoccupied land renders the dangers of burial most remote, but only to countries of limited area and dense population, as the states of Europe and Asia; we answer that already in our large cities the sanitary aspects of the question of burial are justly

awakening concern, and the rapid encroachment of Greenwood and Calvary on the resident portion of Brooklyn, and the extension of New York towards Woodlawn, are only illustrations of how speedily discussion must give place to action, if we wish to guard against the insidious baneful influences that have in Europe depopulated or rendered uninhabitable the very centres of cities, and left their mark, not only in the bodies of the dead, but also in the deteriorated health of the living.

The assertion of Sir Henry Thompson, that "no dead body is ever buried within the earth without polluting the soil, the water, and the air around and above it," may be regarded as axiomatic. Equally true is the statement made by Mr. T. Spencer Wells before the British Medical Association, "that decomposing human remains so pollute earth, air, and water as to diminish the general health and average duration of life."

It is generally acknowledged that the air exhaled from the dead, if respired in a concen-

trated form, will prove fatal, and that even when diluted by the surrounding atmosphere, will lower the standard of health—the vital powers of the community. Indeed, the analysis of the air in and near graveyards has given proof positive of its deleterious nature.

According to an eminent authority (Dr. Parkes, *Practical Hygiene*), the decomposition of bodies gives rise to a very large amount of carbonic acid. Ammonia and an offensive, putrid vapor are also given off. The air of cemeteries is richer in carbonic acid than normal air, being in the proportion of .7 to .9 per thousand, while the normal amount is .4 volumes per thousand. Organic matter also exists in abnormal quantities, as tested by potassium permanganate.

It has been calculated that, when intra-mural burial was carried on in London, two and one-half millions of cubic feet of carbonic acid were disengaged annually from the 52,000 bodies then buried.

In vaults the air contains much carbonic acid,

carbonate or sulphide of ammonium, hydro-sulphuric acid, and organic matter—and in the latter fungi and germs of infusoria abound.

The effect of constantly breathing an atmosphere containing an excess of carbonic acid is not perfectly known. Dr. Angus Smith has attempted to determine the effect of carbonic acid *per se*—the influence of the organic matter of respiration being eliminated. He found that three volumes per thousand caused great feebleness of the circulation, with diminished rapidity of the heart's action; the respirations were, on the contrary, quickened, and were sometimes gasping. These effects were lessened when the amount of carbonic acid was smaller; but were perceptible when the amount was as low as one volume per thousand.

The presence of a large amount of carbonic acid in the air may lessen the elimination of carbonic acid from the lungs and thus retain the gas in the blood, and in time possibly produce serious alterations in nutrition.

The period required for the body to decay after inhumation varies greatly according to the

climate, the nature of the soil, and the covering in which it is enveloped. Low, damp grounds, particularly when they are percolated by water, hasten decomposition ; dry, high, and well-ventilated ones, on the contrary, retard it.

When numerous burials within a comparatively short period have occurred in a limited space, the earth becomes saturated with the products of decomposition to such a degree as to be incapable of further absorbing them ; decomposition, under such circumstances, is retarded, and its products escape directly into the atmosphere. It has been proven that these gases will rise to the surface through eight or ten feet of gravel, and that practically there is no limit to their power of escape.

Alluding to this subject, Mr. William Eassie (*Cremation of the Dead*, p. 60) cites an instance of a church-yard in Stuttgart in which only five hundred were buried annually, and not more than one in each grave; but, carried by the wind, the emanations from the dead bodies were perceptible two hundred and fifty paces distant.

It has been estimated that the poisonous

atmosphere breathed by grave-diggers shortens, by at least one-third, their natural duration of life and working ability.

Irrespective of the specific poisons communicated to the atmosphere by dead bodies, the abnormal quantity of carbonic acid set free is alone productive of lowered vitality, and is a source of danger. Works on hygiene teem with examples of the fatal properties of an atmosphere containing this gas in excess. A familiar instance is that of the passengers of the ship Londonderry, in 1848—one hundred and fifty of whom were shut up by the captain, during a storm, in the steerage 18x11x7 feet. Seventy of them died, in an incredibly short space of time, with convulsions and bleeding at the eyes and ears.

Mr. Chadwick (*Report on Interments in Towns*) and the General Board of Health, of London (*Report on Extra-Mural Sepulture*, 1850), demonstrated that, in church-yards thickly crowded with dead, vapors are given off which, if not productive of any specific disease, yet increased the amount both of sickness and mortality. In

some instances this may be from contamination of the drinking water; but, in other cases (as in the houses bordering the old city grave-yard, where the water was supplied by public companies), the air must have been instrumental in producing disease.

The analysis of water in and near grave-yards, proving it to be contaminated with the products of the decomposition of dead bodies, is one of the strongest arguments pointing conclusively to the actual tangible danger of burial.

Dr. Parkes, whose investigations into this subject have been so thorough, states that "water from grave-yards contains ammonium and calcium nitrites and nitrates, fatty acids, and much organic matter. Lefart found a well more than three hundred and thirty feet from a cemetery to be largely contaminated with ammoniacal salts and an organic matter which was left on evaporation; the water, though clear at first, had a vapid taste and speedily became putrid."

The history of public health abounds with

instances illustrating the fatality attending the consumption of water contaminated by proximity to grave yards. Mr. T. Spencer Wells alluded to a striking example of this, in the sanitary history of London (Remarks on Cremation, before the British Medical Association, 1880), when he said that "water neither cloudy nor stinking, but rather enticing and popular—like the water of the Broad Street pump, in 1874—has carried cholera to those who drank it. How often typhoid fever has been caused in this way who can tell?" We might quote many instances of the effects of drinking water from wells or springs in the vicinity of grave-yards, but the fact that such water is no longer considered potable will hardly be questioned.

There is, however, no doubt that, notwithstanding its acknowledged impurity, many country towns, whose grave-yards are in their midst, are still, through ignorance or carelessness, daily drinking disease and death. An English writer very pertinently remarks that "if the formation of a deep sewer will suffice to drain dry the wells near its line of march, then

the sinking of a well near a burying ground must help to drain the latter."

The diseases prevalent in and near graveyards are, notably: diarrhœa, dysentery, throat diseases, and fevers. The observations of Darwin, in 1837, and the more recent experiments of Pasteur have demonstrated beyond a doubt the great danger of depositing animal remains in the earth. These experiments conclusively show that splenic fever, which depends on a specific germ emanating from the dead bodies of animals victims of this disease, is propagated by these germs being brought to the surface through the instrumentality of earth-worms. As evidencing the dangers and the wonderful communicability of disease, we quote the account of Darwin's and Pasteur's experiments, as it appeared in a recent number of the *British Medical Journal.*

"The outbreak of foot-and-mouth disease, recently reported, calls the attention of our sanitary authorities to the advisability of adopting the cremation rather than the burial of diseased cattle. Pasteur has shown that the soil of fields where cattle dying of "charbon" or splenic fever have been

buried remains permanently infected with the disease, and becomes at any moment the origin of new outbreaks. Mr. Spencer Wells recently pointed out, in his paper at the last meeting of the British Medical Association, the observations of our own Darwin 'on the formation of mould', made more than forty years ago, when he was a young man, are curiously confirmatory of the recent conclusions of Pasteur. In Darwin's paper, read at the Geological Society of London, in 1837, he proved that, in old pasture-land, every particle of the superficial layer of earth, overlying different kinds of subsoil, has passed through the intestines of earth-worms. The worms swallow earthy matter, and, after separating the digestible or serviceable portion, they eject the remainder in little coils or heaps at the mouths of their burrows. In dry weather the worm descends to a considerable depth, and brings up to the surface the particles which it ejects. This agency of earth-worms is not so trivial as it might appear. By observation in different fields, Mr. Darwin proved, in one case, that a depth of more than three inches of this worm-mould had been accumulated in fifteen years; and, in another, that the earth-worms had covered a bed of marl with their mould in eighty years to an average depth of thirteen inches.

"Pasteur's recent researches on the etiology of 'charbon' show that this earth-mould positively contains the specific germs which propagate the disease; and that the same specific germs are found within the intestines of the worms. The parasitic organism, or *bacteridium*, which, inoculated from a diseased to a healthy animal, propagates the specific

disease, may be destroyed by putrefaction after burial. But, before this process has been completed, germs or spores may have been formed which will resist the putrefactive process for many years, and lie in a condition of latent life, like a grain of corn, or any flower-seed, ready to germinate, and communicate the specific disease. In a field in the Jura, where a diseased cow had been buried two years before at a depth of nearly seven feet, the surface-earth not having been disturbed in the interval, Pasteur found that the mould contained germs which, introduced by inoculation into a guinea-pig, produced charbon and death. Further, if a worm be taken from an infected spot, the earth in the alimentary canal of the worm contains these spores or germs of charbon which, inoculated. propagate the disease. And the mould deposited on the surface by the worms, when dried into dust, is blown over the grass and plants on which the cattle feed, and may thus spread the disease. After various farming operations of tilling and harvest, Pasteur has found the germs just over the graves of the diseased cattle, but not to any great distance. After rains. or morning dews, the germs of charbon, with a quantity of other germs, were found about the neighboring plants; and Pasteur suggests that, in cemeteries, it is very possible that germs capable of propagating specific diseases of different kinds, quite harmless to the earth-worm, may be carried to the surface of the soil, ready to cause disease in the proper animals. The practical inferences in favor of cremation are so strong that, in Pasteur's words, they 'need not be enforced.'"

Diarrhœa and dysentery seems to be produced by suspended earthy and animal organic matters—calcium and magnesium sulphates and chlorides, calcium and ammonium nitrates, and large quantities of sodium and magnesium chlorides in solution. The animal organic matter derived from grave-yards appears to be especially hurtful in producing diarrhœa. The constant prevalence of dysentery at Secunderabad, in the Deccan (India), appears to have been partly owing to the water which percolated through a large grave-yard. One of the sources of water contained, by analysis, according to Dr. Parkes, one hundred and nineteen grains of solids per gallon; and in some instances there were eight, eleven, and even thirty grains per gallon of organic matter. The same authority states that the great loss by dysentery in the Peninsula at Cindad Roderigo was partly attributed by Sir J. McGrigor to the use of water passing through a cemetery where nearly 20,000 bodies had been hastily interred. Dr. Parkes, speaking of the prevalence of disease in houses bordering closely the old city

grave-yards of London, states that, in the cholera epidemic of 1849, the disease was especially virulent and fatal among the inhabitants of these houses, that no cases recovered, and that all other diseases in these localities assumed a very violent and unfavorable type.

The records of the French Academy of Medicine bear testimony to the fact the putrid emanations from Pere-la-Chaise, Montmartre, and Montparnasse have caused frightful diseases of the throat and lungs, to which numbers of both sexes fall victims every year. It is related that when a large, common grave, fifty feet deep, was dug in the church-yard of St. Innocent, Paris, candles would not burn in the cellars of the adjacent houses, and those who only approached their apertures were seized with alarming attacks.

The dangers of malignant fever following the inhalation of the atmosphere of churches under which burial vaults are made use of, or interments made, are spoken of by all writers on this subject. This fever has been communicated to

sextons when cleansing and shaking the mattings of the church floor.

There are many cases of disease on record produced by the opening of graves. Vicq d'Azyr refers to an epidemic in Auvergne caused by the opening of an old cemetery; the removal of the old burial place of a convent in Paris produced illness in the occupants of the adjoining houses. (Tardieu, *Dict. d'Hygiene*, p. 517.)

In India the cantonment at Sukkur was placed on an ancient Mussulman burial ground and the station was most unhealthy, fevers abounding. (Norman Chevers, *European Soldiers in India*, p. 404.)

Rammazzini (*Maladies des Artizans*, p. 71) states that sextons entering places where there are putrefying corpses are subject to malignant fevers, asphyxia and suffocating catarrhs. Fourcroi remarks that there are a thousand instances of the pernicious effects of cadaveric exhalations; and Tardieu (*Dict. d'Hygiene*, p. 463) has collected a very considerable number of cases, not only of asphyxia, but of several

febrile affections produced by exhumation and disturbance of bodies.

Physicians in our own city whose practice has been among the residents of neighborhoods adjoining old burying grounds; sanitary reports of epidemics; the humble voice of the village doctor from hundreds of little hamlets where water and air contaminated by graveyards have been the factors of disease; the mourners in decimated families; universal history—all unite in proclaiming the dangers of the "earth to earth system" in the past, and with unanimous voice demand that the bonds of custom, and superstition, and ignorance, and the equally strong silken cords of false sentiment be sundered: that common sense sound the death-knell of a system which has been instrumental in causing the death of unnumbered hosts: and the present age be signalized by the adoption of that mode of burial attended with least danger to the living, and, at the same time, offending no Christain doctrine, intelligent faith, or healthy sentiment.

Chapter III.

HISTORY OF CREMATION.

Cremation among Ancient Nations, and in Greece, Rome, India, Siam, Switzerland, Germany, Holland, France, England, Belgium, Japan, and the United States.

Cremation was the general practice of ancient nations—except the Egyptians, Hebrews, and Chinese, among whom bodies were respectively mummified, enclosed in sepulchres, and buried in the earth.

In Greece, burning was denied only to suicides, persons struck by lightning, and unteethed children. Burial, however, was permitted; but intra-mural interment was forbidden, from the belief that the presence of the dead brought pollution to the living.

At Rome, burning on the pyre was the rule from the close of the republic to the end of the

fourth century. It is recorded that the Jews resorted to cremation in time of plague: as in the Vale of Tophet.

Among the tribes and nations practicing cremation at the present time, the ashes are disposed of in different ways. Some store them in urns, some bury them in the earth, some throw them to the winds, and some (the Digger Indians) smear them with gum on the heads of the mourners.

With the ancient Athenians, when soldiers fell in battle, it was the custom to collect them in tents, where they lay for a few days, in order to insure recognition. Each tribe then conveyed their dead in cypress shells to the *Ceramicos* or place of public burning; an empty hearse following behind in memory of the missing.

During the Trojan war men were sent out from each side to collect the dead, and the Trojans and allies burnt on separate pyres.

Numerous dead Saracens were burnt by the King of Castile. During the war between the English and the Burgundians and the French—

the latter led by Joan of Arc—the dead were on one occasion piled up outside the city of Paris, and consumed in one huge pyre.

Hercules is reported to have burnt the body of Argus because only in this way could he return the son to a sorrowing father.

As illustrating the manner in which cremation was anciently practiced by Eastern nations, W. Eassie (*Cremation of the Dead*) gives several descriptions of the forms of cremation now in vogue which differ little from the more ancient ones.

Among the poor in India the actual process of burning is simple and effective and well suited for people amongst whom fuel is one of the dearest of the necessaries of life, besides being subject to a tax. A bed is prepared (it is said in the old books that it should be as long as a man with his arms extended above his head, a fathom wide, and a space deep; it is also said that it ought to be on rising ground, so that the water poured on the ashes may easily run off): on this bed is laid a layer of wood and cakes of dry cow-dung, which, in this

country, is the most frequent form of fuel. The body, which is brought on an open bier, is laid on this and covered with fresh layers of wood. Fire is set to the heap, which is then covered with a thin layer of earth. The process, which lasts altogether twelve hours or more, is divisible into two portions: First, the fire is allowed to char and smoulder, out of the free access of air, till all the heap becomes a glowing, red-hot mass, just as in charcoal burning; after the fire has penetrated the whole heap it is poked up, the air admitted and there is a thorough, blazing fire, which goes on burning till all the fuel is turned into ashes, amongst which are discernible some of the hardest bones—as the molar, temporal, and shafts of the long bones—semi-vitrified.

This is a description of a funeral of the poorer kind. The funeral of an eminent citizen is described in the *Bombay Times* as follows:

"The funeral procession, from the house of the deceased, was sufficiently large to demand a special report. Not less than a thousand persons figured therein, every family in the caste having furnished one or two of its male members to

swell the melancholy cortege. Bareheaded and dressed in white garments the procession marched slowly on. First came an array of link-bearers; then the corpse borne aloft on the shoulders of six men, surrounded by lighted torches and preceded by Brahmin priests chanting a monotonous dirge. Hard by was piled a heap of fragrant sandal-wood, split into thin faggots, and these the relatives of the deceased laid one by one upon the body, the priests all the while reciting prayers for the dead. This ended, the servitors of the dead ground built up the pyre to its proper height with common fire-wood. All being ready for the final ceremony, the Brahmins lit a small fire of sandal-wood, and, having consecrated it, gave a flaming brand to each of the kinsman present whose duty it was to light the pyre. Then the flames shot up into the air, a canopy of smoke overhung the spot, and all was over. The mourners dispersed, and by midnight nothing remained of our well-known citizen but a handful of white ashes, and a few calcined bones."

From *Lippincott's Magazine* the following description of cremation, as practiced in Siam, is given:

"Burning is now, and has been for centuries, the universal custom in Siam—preferred, it is supposed, because of the facility it affords for removing the precious dust of the loved and lost. In old aristocratic houses I have seen, arranged in the family receptacle, massive golden urns, the ashes of eight, ten, or twelve generations of ancestors; and

these are cherished as precious heirlooms, to descend through the eldest male branch.

"If the deceased belong to a private family of moderate means, the burning takes place from four to six days after death; if he was wealthy, but not high born, the body may be kept a month, but no longer; while the remains of a noble lie in state, after being embalmed, from two to six months, according to rank. When the time for the funeral has arrived, the body is laid in a receptacle on the summit of a stately pyramid, the form and material of which indicate the wealth and the position of the deceased, and surrounded by perfumes and tiny faggots of sandal-wood, is consumed by fire, and the ashes collected by the priest and deposited in an urn."

The oldest case of cremation on record in England occurred in 1769 when, in obedience to the directions given in her will, the body of Mrs. Pratt, of George Street, Hanover Square, was burned to ashes in the new burying-ground adjoining Tyburn Turnpike.

In Italy, where it has been received with most favor in recent years, cremation was proposed by Moleschott, in 1852; by Coletti, in 1857; and at several Health Congresses, between 1858 and 1869, by Dujardin, Bertani, Castiglioni, and Coletti. The first incineration

took place in 1869 when the corpse of the Maharajah of Kohlahpore was burned on a pyre of aromatic woods at Florence. In 1872 the Chevalier Albert Keller wrote to Professor Polli—an inventor of a crematory furnace—expressing his desire that his remains should be burned: He also built, at his own expense, a crematory temple, which he bequeathed to the city. This ardent promotor of cremation died in January, 1874; but it was not till February, 1876, that the Milan Cremation Society was founded. In December, 1876, the Milan Society was reorganized, Dr. de Cristoforis elected president, and a new crematorium built. The members, at that time, numbered two hundred; and, during the three years the Society had existed, fifty cremations had taken place, and there had been also ten at Lodi. From January, 1876, to August, 1880, we are told there were eighty-six cremations conducted at Milan and Lodi. It is worthy of note that, of the bodies cremated in Italy during the first eight months of 1880, over fifty per cent. were those of women.

The custom of incineration among the ancient Romans is still exemplified in the columbaria of the Appian Way. There are also columbaria in the Pamtili Villa and in the necropolis near Porta Maggiore. The practice extended in ancient times over various parts of Italy. It is only recently that the Rome Cremation Society, presided over by Dr. Francesco Ratti, has been granted, by the municipality, a site for a crematory. The furnace is to be erected at Campo Verano—the cemetery near the church of San Larenzo. Additional crematories are to be constructed shortly at Padua, Cremona, and Nadina.

At Zurich, in Switzerland, there is a society of four hundred members. Cremation is only authorized where the deceased has left a written request that his remains be thus disposed of and it is clear that death ensued from natural causes.

In Germany, Gotha still continues the centre of the movement, though there are also crematories at Dresden and Breslau. At Gotha, between December 10th, 1878, and the last of

January, 1879, there had been sixteen cases of cremation. The people whose remains were cremated came from all parts of Germany,—Dresden, Hanover, Breslau, Leipsic, and even Vienna.

In Holland, the advocates of cremation have not yet obtained legal sanction; but they have renewed their petition for an amendment of the burial laws, and the Dutch Cremation Society has branches in eleven towns, with nine hundred and fifty members.

In France, a society has been formed, under the presidency of M. Koechlin Schwartz, which numbers among its members a large number of physicians and scientific men, and such well-known people as Gambetta, Herold, Henri Martin, Etienne Arago, Schoelcher, General Berthelot, Bischoffsheim, Prince Pierre Soltykoff, Compte de Donville, Maillefeu, Edmond About, etc. The Society has first to obtain a law permitting cremation, and its funds will then be devoted to the building of furnaces and the purchase of inventions tending to simplify the process.

In England, at the last meeting of the British Medical Association, the following address to the Home Secretary was very generally signed:

"We, the undersigned members of the British Medical Association assembled at Cambridge, disapprove the present custom of burying the dead, and desire to substitute some mode which shall rapidly resolve the body into its component elements by a process which cannot offend the living, and may render the remains absolutely innocuous. Until some better mode is devised we desire to promote that usually known as cremation. As this process can now be carried out without anything approaching to nuisance, and as it is not illegal, we trust the Government will not oppose the practice, when convinced that proper regulations are observed, and that ampler guarantees of death having occurred from natural causes are obtained than are now required for burial."

The Cremation Society of England has purchased an acre of freehold land near Woking, and has erected a crematorium, on the model of the Gorini furnace, and has experimentally proved that the body of an animal may be reduced to a clean, innocuous ash, weighing about a twentieth of the unburnt body, at a very small cost, and without any appreciable odor or smoke. The Society has obtained the

very highest legal authority, and has recently issued a very valuable volume of transactions. The subject of cremation is being introduced to the public, and the Society is sanguine of ultimate success, though fully conscious of the prejudice they will have to overcome—indeed have already met with.

In Belgium, one society in Brussels has over four hundred members, and M. Cretur has been thanked by the Government for the successful cremation of the soldiers killed near Sedan.

In Japan, where cremation has been in operation for many years, its feasibility is practically proven. Miss Bird (*Unbeaten Tracks in Japan*) gives an instructive account of the practice as in operation at the present day, as witnessed at a cremation ground at Kirigay. It appears that among Buddhists, especially of the Monto sect, cremation was largely practiced till it was forbidden, five years ago, as some suppose, in deference to European prejudices. Three years ago, however, the prohibition was withdrawn; and, since then, the number of bodies burned has reached about nine thousand annually.

The building or erection in which the process is carried out is made of "wattle and dab", with a high roof and chimneys, resembling those of "oast-houses" in Kent, and suggests a farm rather than a funeral pyre. The end of this building, nearest the road, is a little temple, much crowded with images and small red earthenware urns and tongs, for sale to the relatives of deceased persons; and beyond this are four rooms, with earthen floors and mud walls; nothing is noticeable about them, except the height of the peaked roof and the dark color of the plaster. In the middle of the largest are several pairs of granite supports, at equal distances from each other; and in the smallest there is a solitary pair. This was literally all that was to be seen. In the large room, several bodies are burned at one time; and the charge is only one *yen* (about $1.00); solitary cremation costing five *yen*. Faggots are used, and twenty-five cent's worth ordinarily suffices to reduce a human form to ashes. After the funeral service in the house, the body is brought to the cremation ground, and left in charge of

the attendant, a melancholy, smoked-looking man, as well he may be. The richer people sometimes pay priests to be present during the burning, but this is unusual. There were five "quick tubs" of pine, hooped with bamboo, and containing the remains of coolies, waiting in the larger room, at the time of Miss Bird's visit; and a few oblong chests in the small rooms, containing those of middle-class people. At 8 P. M., each coffin is placed on the stone trestles, the faggots are lighted underneath (the fires are replenished during the night), and, by 6 A. M., all that which was a human being is a small heap of ashes, which is placed in an urn by the relatives and honorably interred. In some cases the priests accompany the relatives on this last mournful errand. Thirteen bodies were burned the night before Miss Bird's visit, but there was not the slightest odor in or about the building; and the interpreter told her that, owing to the height of the chimneys, the people of the neighborhood never experienced the least annoyance, even while the incineration was going on. The simplicity of the arrange-

ment, Miss Bird remarks, is very remarkable; and there can be no reasonable doubt that it serves the purpose of the innocuous and complete destruction of the corpse, as well as any complicated apparatus; while its cheapness places it within the reach of the class which is most heavily burdened by ordinary funeral expenses. The cremation-ground is in a country made beautiful by red camellias, feathery bamboo, and cryptomeria; and Miss Bird saw nothing about it that was ghastly or distasteful.

The process of cremation in modern Europe was at first stopped, and has since been prevented, in great measure, by the Christian doctrine of the resurrection of the body, partly also by the notion that the Christian's body was redeemed and purified. Science has shown that cremation merely produces quickly what putrefaction takes a long time to accomplish; but the feeling of opposition still lingers among the clergy of more than one nation. Some clergymen, however (as Mr. Haweis, in his *Ashes to Ashes; a Cremation Prelude. London*, 1874), have been prominent in the reform

movement. The objection was disposed of by Lord Shaftsbury when he asked: "What would, in such a case, become of the blessed martyrs?"

Cremation in our own country has as yet scarcely a history; but, during the last year, several steps have been taken which have inaugurated the reform. Numerous small societies have been formed, but the most notable advances have been made in the founding of two large and vigorous societies numbering nearly one hundred members each—viz., the St. Louis Cremation Society, under the presidency of Dr. H. S. Chase, and the New York Cremation Society, under the presidency of the Rev. J. D. Beuglass, U.S.N. The latter Society now holds meetings twice a month, at which, in addition to the regular business, a lecture is generally delivered. The meetings are well attended by the public, the audiences averaging about three hundred in number. A number of its members have lately organized a joint stock company, known as the United States Cremating Company, which proposes to erect a cremating temple in the vicinity of New York at an early

day. The St. Louis Society also proposes to erect a furnace. These, with the crematories at Washington, Pa., will then give three crematories in three different sections of the country, and will afford ample facilities for those wishing to avail themselves of the advantages of this means of disposal of the dead. The New York Legislature has also passed a bill authorizing the formation of cremating companies.

Dr. Le Moyne, in his pamphlet on cremation, states that the first instance of cremation, in the United States, was that of the body of Colonel Henry Laurens—a member of the military family of General Washington and a great favorite of our first president. His body was cremated in South Carolina, in 1796. The second was that of Henry Barry, of Marion, South Carolina. The third was the body of Baron de Palm, whose body was cremated at Washington, Pa., December, 1876. The fourth was that of Dr. Winslow, of California, at Salt Lake City, who had instructed his administrators to thus dispose of his remains. The fifth was the child of Julius Kircher, in his own

furnace in New York city in the Fall of 1876. The sixth was that of Mrs. Jane Pitman, of Cincinnati, in the crematory of Washington, Pa., in February, 1878. Dr. Le Moyne also says that, since that time, more than one hundred applications have been made to him for prospective cremation.

Up to the present time (April, 1881), six more bodies have been cremated at the Le Moyne crematorium, Washington, Pa., making eleven in all. Although the actual number thus far cremated is apparently small, it must be remembered that the reform is in its earliest infancy, and that the bodies cremated represent the deaths among a great number of people who are already enrolled as advocates of the reform.

It is to be regretted that the recorded ancient history of cremation is so incomplete, though in actual use by so many nations. A more extensive history would have enlightened us as to whether cremation was not resorted to by many nations as a sanitary necessity, and set at rest the vexed question of its religious origin.

The very general practice of burying bodies in the precincts of a church, and the religious ceremony which preceeds both European burials and Asiatic cremations has given the question a religious aspect. It is, in reality, a sanitary one.

Although cremation may have been regarded by people (like the Siamese) as a religious rite or superstitious custom, it is unquestionably—when pursued by the most enlightened nations—a sanitary measure. That the history of cremation in the United States during the next century will be a copious one, illustrative of steady progress, we do not doubt; and it is not too much to believe that the advocates of this reform may see it adopted as the most general, sensible, economical, and safe method of disposal of the dead.

Chapter IV.

CREMATION FROM A SENTIMENTAL POINT OF VIEW.

Feelings inspired by Thoughts of Cremation — Reverence for the Dead Consistent with Cremation — Cremation fosters and encourages Affection for the Dead — Burial and Cremation Contrasted.

Very superficial observation will convince the advocate of cremation that the strongest foe to the general adoption of this method of disposing of the dead he has to contend with—and the overthrow of which is the *sine qua non* to the attainment of converts—is the deeply-grounded feeling of horror with which the majority associate the idea of burning bodies. At once visions of holocausts, which reportorial skill has described in the most sensational language, flit before excited imaginations; or, perhaps, to the

fancy of the more strictly orthodox, are suggested the vividly colored pictures of consumption by fire and brimstone which an austere religious training has portrayed to them.

However we may account for it, the fact remains that, on first presentation, the idea of cremation is distasteful to the many. They may admit all your arguments in favor of the expediency—even the ultimate necessity, from a sanitary point of view—of a substitute for the present form of burial, and some of the less tender-hearted may acquiesce in your assertion that cremation was esteemed by ancient nations, and that, at the present time, the Japanese are being cremated to the number of ten thousand a year, and, in a conciliatory way, will say that it is probably the best way to dispose of the dead in those countries. But when you come nearer home, and suggest to them the application of this method to their relatives or friends, or even in their own case, they will fly to arms, and rebel at your inhuman cruelty and scientific callousness.

It has been truly claimed that no error ever spread widely or became generally received, but that had some foundation in fact—some truth at the bottom of it.

We believe this general repulsion for cremation to be an error which has become widespread from the fact that it is founded on an incontrovertible, never-to-be-disparaged truth—namely, reverence for the dead and affectionate regard for their memory.

The apostles of cremation, if accused of striving to suppress and murder such sacred feelings, we can imagine would dramatically exclaim in chorus: Forbid it, Heaven! The actual fact is that such a purpose is as far removed from their real endeavor as is Dan from Beersheba.

They believe that, instead of violating the sacredness of these natural and commendable feelings, cremation, rightly considered, fosters and develops them. The aim of all true apostles of the faith anxious for its propagation should be, therefore, to disabuse the general mind of this erroneous view, remove from their

eyes the glasses colored by the artizans custom and habit, and teach them to see clearly, without prejudice, how all true sentiment and sacred regard for the dead are in most perfect harmony with a system which, by the purifying influence of fire, resolves into its elements the corruptible body, and leads the living, in the ashes of their dead, to see only the fitting emblem of the mortality of the body, and to fix their hopes on the reassuring, comforting belief in the immortality of the soul.

From a purely sentimental standpoint, as sentimentalists, let us contrast the system of cremation with that of the present form of burial. The sentimentalist is shocked by the idea of burning the body. Is he not more horrified by that of slow putrefaction? His feelings revolt at a process which reduces the once loved lineaments to an indistinguishable, irrecognizable, handful of ashes. Are his sensitive susceptibilities less aggrieved by the equally irrecognizable, disgusting mass being rapidly changed by decomposition into noxious, poisonous gases and fluids?

Rather are not sentimentalists forced by facts to the conclusion that their feelings of aversion for cremation are unjust, and should be more naturally associated with a system of burial which does violence to pure aesthetics, to simple love for the beautiful for its own sake, as expressed in the attributes of reverence.

The objects of the two systems are the same, even from the sentimentalist's side of the question, who, regardless of the baser objects of disposal of the body—such as its resolution into its elements—seeks only to honor the dead. To the candid observer are not all the ways by which the buried body is honored susceptible of application to the cinerary remains? The answer must be in the affirmative, and not only so, but, looking at this phase of the question, it must be conceded that existing tombstones, marking the places where the remains of the body once were, have but an ephemeral existence compared to the lasting monuments, treasured in the very heart of the circle bereaved, that cremation makes possible.

We believe the abhorence, entertained by many, of cremation, depends to a very great extent on the universal tendency of individuals and nations to resent any interference with established customs, to reject any innovation simply because it is an innovation.

History over and over again testifies to the fact that reforms on which depended the very life of nations have been consummated in the teeth of general opposition—reforms whose necessity was not only recognized at last by those who most strongly opposed them, but it has frequently happened that these very thoughtless conservatives have become eventually the strongest advocates of the ideas they formerly contemned.

In the light of such facts as these alone are the antipathies excited by cremation explicable: they certainly have no existence in reason. The emotion of repulsion depends for its production on inherited tendencies and those varied circumstances and surroundings of birth and education which conspire to form person-

ality. These emotions cannot be conquered in a day; but there are strong grounds for the hopes of the thoughtful disciples of cremation that the mists of prejudice that now obscure the views of sentimentalists will be dispelled by the rising sun of intelligent discussion. They, at least, have the evidence of history and the consciousness of right to encourage them.

Chapter V.

DESCRIPTION OF CREMATION AND APPARATUS.

Description of Cremation at Washington, Pa., by "An Eye Witness" — Description of Crematory at Washington, Pa. (2 Illustrations) — Gorini and Venini Furnaces, (Illustration) — Siemen's Apparatus — Disposition of Ashes after Cremation.

The sensibilities of many who look upon cremation with horror are shocked, not from any qualities inherent in the process itself, but from the fact that they have formed false impressions of how it is carried on, the separate steps, and kind of apparatus by which the bodies to be cremated are resolved into an innocuous ash.

A very simple and complete description of the process—the perusal of which must rob cremation of its horrors and give the reader a

clear conception of its effectiveness, beauty, and attractiveness—we copy from a pamphlet written by "An Eye Witness" of the process, who had before regarded it with repugnance, but who had been led by witnessing it to be a most earnest advocate :

"A furnace fire is built and kept burning for twenty or thirty hours before the cremation is to take place. Immediately above the fire is placed in a horizontal position a cylinder of clay called the incinerator, three feet in diameter by seven feet long. This fire clay incinerator, the walls of which are from one to two inches thick, receives to itself the intense heat of the fire below, but does not admit the flames. The consequence is that the body, when placed in the incinerator, is not, in a proper sense of the word, burned. It is reduced to ashes by the chemical application of intense heat. Gases are driven off or absorbed, and, being carried down into the fire from the incinerator and led back and forth twenty-five feet through its flames, are utterly consumed. Even the smoke of the fire is consumed, and nothing can be seen issuing from the chimney but the quiver of the heat. The process might be called, as we have said, the spiritualization of the body, the etherealization or sublimation of its material parts.

"When the incinerator has been raised to a white heat it is ready for the reception of the remains. As the cover is removed from its mouth the inrushing air cools it from a

white to a red heat, and the whole inner surface is filled with a beautiful rosy light which is fascinating to the eye. It looks like the blush of dawn upon the sky, or like the exquisite tints which sometimes flicker along the Aurora Borealis. There is nothing repulsive about it, and nothing, as has been said, to suggest the idea of fire except the intense heat.

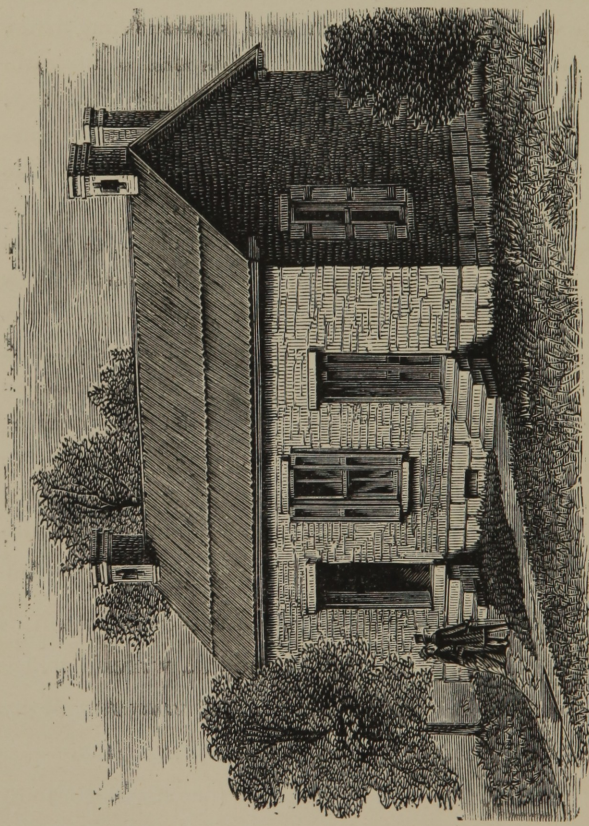
"The body, being decently clad for burial and tenderly laid in the crib provided for the purpose, is wholly covered with a clean white sheet which has been dipped in a solution of alum. The effect of this is entirely to prevent smoke or fumes or flame, which would otherwise arise from putting anything inflammable into the midst of such a heat; but, under its protection, even the extraordinary heat of the incinerator does not produce upon the body the appearance of scorching or smoking or anything of the sort. There is no such impression as that of burning made upon the eye. The sheet, saturated with alum, retains its original position over the crib, and conceals the entire form until nothing but the bones are left; and when the eye first rests upon the remains after they are left in the rosy light of the cylinder, it sees nothing but these bones gently crumbling away into dust under the mystic touch of an invisible agent, whose only appearance to the eye is like the tremor of the Northern Lights in the sky; or, more exactly, the radiation of heat from the earth beneath the summer's sun.

"You have laid a white-robed form within the rosy cylinder and have turned away to think with gratitude that

all is well. You have let your imagination dwell lovingly upon the pleasing sentiment that whatever may be left—beside the calcined bones, most pure and clean—has gone to mingle with the upper air and dwell with sunshine, birds, and flowers. The darkness and the dampness of the earth have been escaped, and so have the perils of grave snatching, the indecencies of a possible dissecting-room, and the nameless horrors of putrefaction. You have pleasant memories to cherish of the 'last sad hour,' which, instead of 'breathless darkness' and the 'narrow house' and the dreadful thud of falling earth upon the coffin, presents to mind a lovely bed of rosy light, and a peaceful form clad in virgin purity resting within its soft embrace. If a lily had been laid upon a bed of pinks or roses, in the summer, and you had seen its fragrance and its beauty all exhale amid the shimmering beams of radiated heat beneath the touch of some invisible and gentle agency, you would have had a not dissimilar experience. And this is neither painful to the eye, nor distressing to the sensibilities, nor ungrateful to the memory."

The following is a less poetical description of the crematory at Washington, Pa., which Dr. Le Moyne has appended to his *Argument to Prove that Cremation is Preferable to Inhumation.*

"The crematory is a brick structure (one story high, thirty feet long, twenty feet wide), divided into two rooms—a reception room and a furnace room. Cremation is performed in a fire-clay retort, such as is used in the manu-



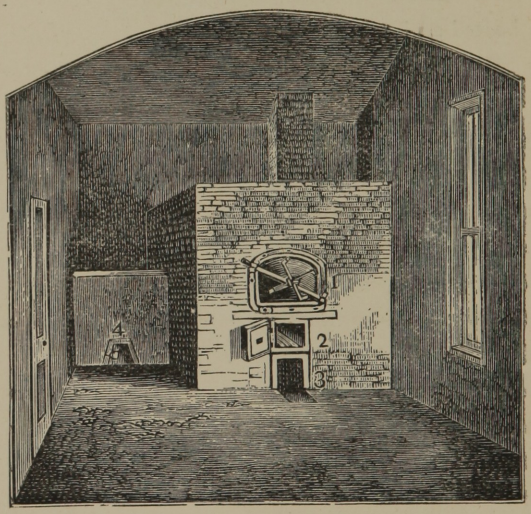
CREMATORY AT WASHINGTON, PA.

facture of illuminating gas, heated to a red heat before the body is introduced. The body is placed in an iron crib, which is arranged to slide easily into the retort. In addition to ordinary burial garments the body is covered with a cloth wet with a saturated solution of alum, which retains its form when heated and prevents any part of the corpse from being seen. During the cremation there is no odor or smoke from the body, as the furnace is a self-condenser of smoke and other vaporable matter. The time required to complete the operation is about two hours; but improvements in the process will doubtless shorten the time. A very small portion of the remains is ashes, but the mass is in the form of calcined bones in small fragments—very white, odorless, entirely deprived of animal matter, and which may be preserved any length of time without change.

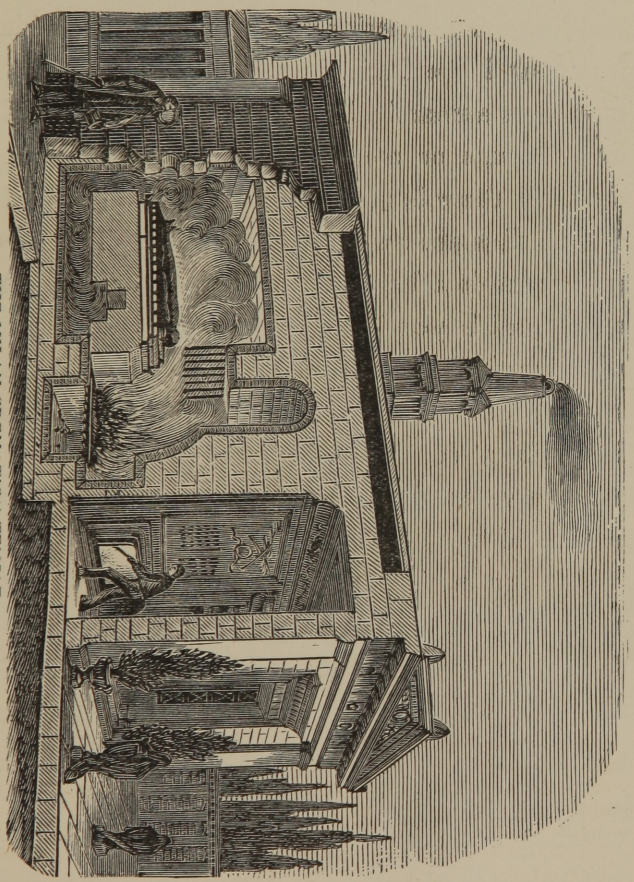
There are from four to seven pounds of these remains, which can be placed for preservation in a one gallon, salt-mouthed druggists' bottle with large ground stopper, into which a photograph with appropriate records may be placed.

This bottle may be placed in the columbarium of the crematory, kept among the memorials of the family of the deceased, or placed in a cemetery."

The engraving on p. 67 shows the cremation temple lately built in the beautiful cemetery of Milan by Mr. Albert Keller. This temple is built in Græco-Doric style, is surrounded by a cupola, forming a chimney through which the products



[The accompanying wood-cut represents that part of the crematory at Washington, Pa., in which the incineration takes place. The numbers refer respectively to (1) the incinerator, closed; (2) the fire-box open; (3) the ash-pit; and (4) the coal-bin. The room, as will be seen, is needlessly plain, and might with slightly increased expense in building be made more attractive. An ornamental front concealing the brick-work and the coal-bin would serve greatly to improve its appearance. With a slightly different arrangement the fire-box and ash-pit might be kept continually out of sight. If the incinerator were turned end for end and made to open from the opposite side, nothing would be seen by the friends of the deceased but its open door and rosy light, which are most attractive to the eye.]



THE MILAN CREMATION TEMPLE.

of combustion escape. The furnace is in the basement, and nearly in the middle of the building. The interior of the building is divided into four large halls, in the first of which the mourners assemble before the body is brought into the urn or cremation chamber; adjoining this hall there is a room in which the bodies in their coffins are awaiting cremation. The next apartment is a large storage room for coal and wood, and beyond this are the furnaces. In an adjoining hall the "Cremation Society of Milan" has its office, and transacts all its business. Here is a curious collection of antique and modern vases, documents relating to cremation, models of furnaces, etc.

The cremating furnace is arranged transversely in the temple to permit the watching of the entire operation through a small window in the side wall of the temple, as shown in the engraving.

The body is placed upon a grate, under which a basin is placed to receive the liquids and ashes that may drop down.

Two furnaces are now before the public,

known as the Gorini and Venini furnaces, after the inventors.

The engraving shows Gorini's furnace, in which the flames and products of combustion pass over the body, thence down a flue and under the base upon which the body rests, thence up the chimney. The body, thus completely enveloped in the flames, is converted to ashes in from one and a half to two hours. Wood or coal may be used, and the expense is about one dollar.

Mr. Venini's apparatus is more complicated than that of Mr. Gorini, but it transforms the tissues of the body into gases in a more perfect manner than any other furnace known.

The apparatus approved by Sir Henry Thompson, an enthusiastic advocate of cremation, attains the resolution of the body by means of hot air—not by the direct contact with the flames. In his articles on cremation, published in the *Contemporary Review*, alluding to this subject, he says:

"A powerful reverberating furnace will reduce a body of average size and weight, leaving only a few white and fragile

portions of earthy material, in less than an hour. I have myself personally superintended the cremation of two bodies, one small and emaciated, of forty-seven pounds weight, and one of one hundred and forty-four pounds, not emaciated, and possess the products—in the former case weighing one and three-quarter pounds, in the latter about four pounds. The former was completed in twenty-five minutes, the latter in fifty. No trace of odor was perceived (indeed, such a thing is impossible), and not the slightest difficulty presented itself. The remains described were not withdrawn till the process was complete; and nothing can be more pure, tested by sight and smell, than they are, and nothing less suggestive of decay or decomposition. It is a refined sublimate, and not a portion of refuse, which I have before me. The experiment took place in the presence of several persons. Among the witnesses of the second experiment was Dr. George Buchanan, a well-known medical officer of the Local Government Board, who can testify to the completeness of the process.

"In the proceeding above described, the gases which leave the furnace chimney during the first three or four minutes of combustion are noxious; after that they cease to be so, and no smoke could be seen. But these noxious gases are not to be permitted to escape by any chimney, but will pass through a flue into a second furnace, where they are entirely consumed. A complete combustion is thus attained. Not even a tall chimney is necessary, which might be pointed at as marking the site where cremation is

performed. A small jet of steam, quickening the draught of a low chimney, is all that is required. On a large scale, the second furnace could be utilized for cremation also, and its products passed through another, and so on without limit."

"By means of a furnace invented by Dr. Wm. Siemens a still more rapid and complete combustion is possible. A body weighing 227 pounds was placed in a cylindrical vessel about seven feet long by five or six feet in diameter, the interior of which had been heated to 2000° Fahrenheit. The inner surface of this cylinder is smooth, almost polished, and no solid matter but that of the body is introduced into it. The product, therefore, can be nothing more than the ashes of the body. No foreign dust can be introduced, no coal or other solid combustible being near it—nothing but heated hydro-carbon in a gaseous form and heated air. Nothing is visible in the cylinder before using it—a pure, almost white interior, the lining having acquired a temperature of white heat. In this case the gases given off from the body so abundantly at first, passed through a highly heated chamber among thousands of interstices made by intersecting fire bricks, laid throughout the entire chamber, lattice-fashion, in order to minutely subdivide and delay the current, and expose it to an immense area of heated surface. By this means the gases were rapidly oxidized and not a particle of smoke issued by the chimney. No second furnace, therefore, is necessary, by this method, to consume any noxious matters, since none escape. The process was

completed in fifty-five minutes, and the ashes, which weighed about five pounds, were removed with ease."

The apparatus by which cremation is effected is chiefly of two kinds, of which there are various minor modifications :

First, that in which the body is reduced by direct contact with the flames, and of this kind are the Gorini and Venini furnaces, which are those most approved in Italy; and secondly, that in which the body is reduced to ashes by means of hot air, at no time coming in contact with the flames. Of this latter kind are the furnaces in use throughout Germany, of which the most perfect illustration is the Siemens' apparatus, and those used in England and America. An important modification of this latter method is that devised by Dr. C. W. Siemens, F.R.S., which intensifies the combustion process by generating gas and hot air and introducing them separately into the cylinder containing the body, so as to add to the inherent heat of the gas and air that produced by their mutual chemical action.

It is of course highly probable that, as the

attention of scientists is more generally concentrated on cremation and the apparatus employed, still more perfect methods of attaining the desired result will be devised. Comparison between cremation as practiced by the ancients and that now advocated, strikingly exhibits the superiority, from both a practical and sentimental point of view, of the modern methods.

A secondary, but not uninteresting, question, is the disposition of the ashes after cremation.

It has been the custom among civilized nations to deposit the ashes in an urn or vase, which, among the ancients, were very beautifully designed, and placed sometimes in the mansion of the deceased, sometimes in tombs, or in underground vaults.

These vases or urns were usually constructed of pottery, though not infrequently other materials were used—as marble, alabaster, or glass.

In addition to this disposition of the ashes, they were sometimes placed in small stone sarcophagi and buried. This latter method would be well adapted for the poorer classes, who could not afford an elaborate receptacle.

W. Eassie (*Cremation of the Dead*) suggests that the custom in vogue among the Romans—that of placing the urns in underground vaults, the walls of which were pierced with arched recesses for their reception—will probably prove the most popular method of disposing of the urns in modern cities where cremation is practiced. Or that the walls of the churches be so constructed as to receive the remains, the wall spaces being apportioned into family receptacles, and the orifices closed with suitable metal gratings ornamentally treated.

We believe that any manner of disposition of the ashes likely to be generally adopted would not offend the taste nor revolt the sympathies of the most fastidious, and it must be admitted that no one familiar with any of the different forms of burial now practiced, whether in the ground or in tombs, and the loathsome contents of the coffins, can fail to be impressed by contrasting the two methods with the greater purity, harmlessness, and inoffensiveness of that one possible after cremation.

Chapter VI.

CREMATION OF DEAD ANIMALS AND OF GARBAGE.

Cremation a Desirable Means of Disposing of Dead Animals and Garbage — Pasteur's Experiments — Cremation of Dead Horses on Battle Field — Cremation during Cattle Plague — Economy of Cremating Animals and Garbage — Bone Earth.

The question of the advisability of disposing of the bodies of dead animals and of garbage is one entirely out of the domain of sentiment, and one against which no sound arguments can be urged.

Although a moment's consideration will suffice to prove that this method of ridding communities of a large proportion of disease-producing matter is indubitably the most expe-

ditious and safest yet proposed; nevertheless, it has not as yet come into general use.

Pasteur's recent experiments concerning the etiology of charbon or splenic fever have demonstrated beyond cavil the power of infectious germs, from the bodies of animals buried in the earth, to be transmitted to the supernatant air and communicate disease. The question of such germs being an active factor in the production of disease is not *sub judice*, but is definitely settled; in view of which it devolves upon the guardians of the public health to take active measures for the suppression of this prolific source of disease.

Mr. Eassie, commenting upon the general adverse feeling to burning even the dead bodies of animals at the present day and the serious evils consequent upon this state of feeling, says: "During the Crimean War the putrefaction of numberless horses in and around the French camps became ultimately a serious matter, and had they been destroyed by fire no evil effects could have followed. During the great plague

of 1865, in Great Britain alone, 132,000 cattle were attacked—17,308 of which were killed, and 81,368 of which died. Had a few hecatombs been slain and burnt at the commencement of the visitation, or had the initial thousand of sickly ones been slain and consumed by fire, in Russia, the steppe murrain would have been speedily stamped out. It has been said that the lower animals which perish in our midst must perforce send thousands of pounds of mephitic vapor into the air, if left unburnt."

The remarks of Sir Henry Thompson, in regard to the economical aspects of cremation, although applied to human remains, would more fittingly apply to the bodies of dead cattle, since it could not be urged against utilizing the bones of animals that it was indecent or in any sense shocking to the sensibilities of the most sensitive; but, on the contrary, would naturally be considered praiseworthy economy. He states "that London was computed, by the census of 1871, to contain 3,254,260 persons, of whom 80,430 died within the year. I have

come to the conclusion, after a very carefully-made estimate, that the amount of ashes and bone-earth—such as is derived from perfect combustion—belonging to and buried with those persons, is by weight about 206,820 lbs. The pecuniary value of this highly concentrated form of animal solids is very considerable. For this bone-earth may be regarded as at least equivalent to at least six or seven times its weight of dried and unburned bones, as they ordinarily exist in commerce. The amount of other solid matters resolvable by burning into the gaseous food of plants, but rendered unavailable by burial, for say fifty or a hundred years or more, is about 5,584,000 lbs., the value of which is quite incalculable, but it is certainly enormous.

This estimate is for London alone; for the United Kingdom, multiply by nine in order to obtain the amount of valuable economic material annually diverted for a long term of years from its ultimate destiny by our present method of interment.

This necessitates the purchase, from other countries, of bones amounting to half a million pounds sterling per annum."

It is very evident, from the above estimate, that the utilization of diseased cattle would effect no inconsiderable saving to a country, regardless of the amount that would be saved from the prevention of disease that would ensue, from the adoption of such a plan.

As to the manner in which the bodies of dead animals might be burned, Dr. Beals suggests, in the *British Medical Journal*, that, until suitable apparatus was devised, the gas-works of towns could be made available by severing the animals into pieces and throwing them into the retorts, when almost instant combustion would take place and the products be utilized.

It is certain that cremation of dead animals would be, both from a sanitary and economical view, an incalculable benefit. In an age when waste products of all kinds are made a source of revenue, it is remarkable that such a feasible and possibly prolific factor in the production of

wealth should have been overlooked, or at least exist in such an undeveloped state.

What shall be done with garbage? is a question the solution of which has long vexed the executive power of Street Cleaning Bureaus and given the public, through the medium of the daily journals, a constant cause of complaint. The present plan of collecting it periodically, or rather spasmodically, and dumping it into the sea (the plan in operation in New York, involving great expense) is notoriously inefficient and abortive.

Among the plans suggested as a substitute for the present unsuccessful one, cremation is advocated by many, and will, we believe, eventually prove the only practicable solution of the question.

The burning of the more easily combustible garbage should be individually effected in the place where it is produced, while that which could not be thus disposed of could be collected and burned by the proper authorities at a much less expense and with far greater efficiency

than is the result of the present extravagant and ridiculously inoperative method.

We are conscious that the subject of burning garbage is an old story in New York city; and though its advisability may be admitted, the question of its adoption is complicated by that disgraceful blight on our city's sanitary progress —the influence of unprincipled politicians. The active discussion by the daily press of sanitary questions, and the awakening interest of the people in these matters, encourages the belief that the public will not long tolerate legislators who, through ignorance or interested selfishness, fail to enact appropriate laws for the prevention of recognized evils which are not only recklessly extravagant, but in the highest degree prejudicial to public health.

But the question of the best disposition to be made of garbage is not merely a local one, and should engage the attention of families and communities and armies in every land. The obstacles which interfere with the public adoption in New York do not exist in private fami-

lies, and in many cities, communities, and armies. Wherever, therefore, this plan is feasible it should be tried, and if this is done, a step in the promotion of hygiene will have been taken whose beneficial results will constantly extend, and the saving—in life, and public and private expenditure—to the State and the individual, will be incalculable.

Chapter VII.

RESUMÉ OF ARGUMENTS FOR AND AGAINST CREMATION.

Sanitary Necessity for Cremation — Religious Argument — Cremation in Accord with the Bible and the Doctrine of the Resurrection — Cremation on the Battle Field — Cremation may prevent the Detection of Crime.

A review of the objections to burial, the laxity of interment, the disorders caused by the poisoning of wells, water courses, and the atmosphere by liquid or gaseous putrid emanations—in fine, the sanitary necessity for cremation, forms the most incontrovertible argument for its adoption.

As Dr. Porter, of St. Louis, in his lecture on "Cremation" (*St. Louis Globe Democrat*, July 18th, 1880), expresses it: "There is a duty

beyond the call of custom, sentiment, or our preconceived ideas of tender regard for the dead. The welfare of the living should guide us in disposing of the dead."

"A body is to be resolved into its original constituents. The water, carbonic acid gas, and ammonia are to be separated from the more solid factors. This is the end to which all methods tend, whether the body be buried, burned, or left untouched upon the earth's surface. How can this be done safely, economically, and without violence to our feelings? We cannot well be careless about the solution of this problem, for we have to deal, not with one body alone, but with many thousands, and they are at our very door."

The sentiments which cluster around the grave are tender and sacred, from the fact that custom and education have associated with the manner of burial, the grave itself, those memoirs which in reality should cherish the departed; the grave has been proven, as aptly called by Mr. Haden (*Earth to Earth*), the *fons et origo*

mali, and it were an easy task to divorce reverential affection from a custom embracing decay, corruption, and the repulsive processes of tardy putrefaction, and associate these universally sacred feelings with the memory of the dead as they lived among us, and not with the receptacle which decency and necessity may have ignorantly chosen.

No manner of disposal of the dead can offend either affection or religion, provided it be done with proper solemnity, and regard to the health of the living. The question is not a religious, but a sanitary one. The Bishop of Manchester very justly remarks that "No intelligent faith can suppose that any Christian doctrine is affected by the manner in which, or the time in which, the mortal body of ours crumbles into dust."

The Earl of Beaconsfield has pertinently observed that "what is called God's Acre is really not adapted to the country which we inhabit, the times in which we live, and the spirit of the age."

An English work, entitled *God's Acre Beautiful*, very truthfully and beautifully argues that the resting places of the dead should be permanent, unpolluted, inviolate; that existing graveyards and cemeteries can only be of temporary use; and that urn burial would lead in the future, as it has done in the past, to more noble and endearing monuments. The spaces surrounding places of worship would be amply sufficient for the preservation of the remains of our dead for generations to come, and existing cemeteries could be converted into permanently beautiful gardens.

Some opponents of cremation go so far in their opposition as to say that it is contrary to Scriptural injunction and the doctrine of the resurrection; but the candid student of the Bible must admit that nowhere in its pages is cremation forbidden, that it was even the custom among the Jews, in time of plague, to burn their dead. As to cremation preventing the triumph of the Christian over death (the resurrection of the body) a sufficient answer to this

absurd argument is the pertinent question: What, in such a case, would become of the Christian martyrs burned at the stake?

In time of war, on the battle field, and in epidemics, recourse has often of necessity been had to cremation.

Mr. Eassie alludes to the desirability and feasibility of armies being provided with an ambulatory furnace for the disposal of dead bodies. If such a scheme was consummated it would indubitably be of immense advantage from a sanitary standpoint.

We come now to the discussion of the only valid argument against cremation—an obstacle, but not an insurmountable one, to its adoption. An argument which, unlike those of sentiment and religion, cannot be refuted—namely, that the general adoption of cremation would directly tend to foster crime and furnish an incentive to criminals. We must admit that, in the present state of criminal law, this would result; but not if guarded against by the enactment of appropriate laws.

The author of *Cremation; by an Eye Witness*, speaking of this matter, says:

"We freely concede that cremation, if generally adopted, would afford one mode of concealment of crime. And this is a *very* serious objection. A body destroyed by poison or other secret and unlawful means might be carried straight to the furnace and there consumed, and the course of justice hindered or opposed. We do not say that it would, but that it might. The possibility is very great. Intrigue and bribery would leave no stone unturned to make the crematory prove the best ally of murderers. We raise our danger signals here and cry alarm No step should ever be taken toward the inauguration of this custom without the most cautious and stringent provisions against its accompanying perils. These perils cannot be exaggerated. They are fraught with the most frightful dangers every way—to the nation, to society, and to the individual.

"But we do not believe that they are inevitable. Judicious legislation and proper enforcement of the laws would raise sufficient barriers against this mode of crime. The very presence of threatening evil would multiply and quicken vigilance. New dangers would provide their own restraints. And if for other reasons this new method is to be approved, surely the wisdom and goodness of the nineteenth century ought to be able to cope with and master the perils it presents."

In England it has been suggested that the stomach of every body cremated be preserved for twenty years, so that should the question of poisoning be brought up in the meantime, an analysis may be made and the fact determined. In this country the proposition has been made to hold an autopsy upon every body to be cremated. We think the advocates of cremation had better let this matter take care of itself for the present. Their self-assumed task of removing the prejudices of the masses against cremation is sufficient for the time, and it would only injure their cause the more to propose the mutilation of the body before incineration.

We cannot more fittingly conclude this brief consideration of the arguments for and against cremation than by repeating to its opponents the challenge of Sir Henry Thompson to Mr. Holland, the Medical Inspector of Burials for England and Wales, to produce, from all the carefully managed cemeteries in the kingdom, with twenty years to elaborate his process, such results as modern cremation has already achieved.

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